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ENTOMOLOGICAL NEWS

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Insects as Food in Japan

By CHARLES L. REMINGTON, Cambridge, Massachusetts

The subject of insects as food has long aroused the curiosity of American naturalists, perhaps because eating insects is a custom both foreign and somewhat disgusting to them. An American's "natural" feeling of repugnance in this case is merely one of custom, and has little practical basis, since peoples have eaten insects in all parts of the world, apparently throughout the existence of *Homo sapiens*. Americans show no hesitation in eating crabs, lobsters, and shrimp, all rather closely related to insects as members of the phylum Arthropoda.

In some local areas of the world, where other animal foods are not available, insects have become a necessary food, supplying needed proteins to the diet of the inhabitants. The writer recently enjoyed hearing a first-hand account of insect eating in one of these areas from Professor Tetsuo Inukai, zoologist of the Hokkaido Imperial University of Sapporo, Japan. Professor Inukai's home province is Nagano Prefecture in north-central Honshu. Nagano is one of the few wholly inland provinces, segregated principally by mountains from ready contact with the sea. The people of the province are unable to get enough fish and meat to fill their protein needs, and they extensively tap the insect population.

The favorite insect for food in Nagano is the Yellow-jacket Wasp (subg. *Vespula*), whose larvae and pupae are highly prized. Pupae of all wasps are eaten when found, but *Polistes* seems to rank next to *Vespula* in frequency of occurrence on Japanese menus. In Sapporo the writer saw *Vespula* pupae preserved in cans and apparently sold in grocery stores. Pro-

fessor Inukai told of various methods of raiding the ground-nesting *Vespula* colonies for the young forms. One is to place a small charge of gunpowder into the nest entrance with a *long* stick, light the fuse, and stand back. After the explosion the wasps are stunned and harmless. A more amusing (to us) method is for the food hunter to divest himself of every shred of clothing. If he moves quietly he may tear up the nest and take the young without being stung, since the vicious little wasps will not sting a nude person. Professor Inukai claimed that he had successfully used this method!

Other very popular insects are all species of Cicadidae (adults), *Oxya verox* (called "Inago" in Nagano Prefecture) and practically all other grasshoppers, all crickets (Gryllidae), and all praying mantes (Mantodea). These insects are killed in a hot pan and, like the wasp larvae and pupae, they are preferably cooked by frying.

Professor Inukai related that all pupae (other than wasps) taken in the soil are carefully avoided. Apparently some are very poisonous. On the other hand, all insects found in fresh water are edible and delicious. Larvae and aquatic adults of Coleoptera, Hemiptera, Ephemerida, Plecoptera, Trichoptera, Odonata, and others are eaten, unsorted. Aquatic insects are frequently gathered by nets and screens which are held in swift water while the stream bottom above them is agitated, stones moved, and trash stirred. Professor Inukai mentioned particularly *Dytiscus* adults and Belostomatidae among aquatic insects commonly eaten.

Larvae and pupae of Cerambycidae, Elateridae, and certain other wood-boring beetles, as well as larvae of Cossidae (wood-boring moths) are dug out of dead wood and are valued as food.

Lepidoptera pupae not found in the soil are said to be very tasty. One of the commonest and most easily gathered is the pupa of the Hag Moth (Eucleidae), a pest insect whose larvae bear stinging hairs. The pupa of the silkworm (*Bombyx mori*) is eaten, not only in Nagano Prefecture, but throughout Japan. When the silk is reeled from the cocoons the edible

and nourishing pupae remain, and are not discarded. They are fried in fat and salted. While a dinner guest of several zoologists at the Hokkaido Imperial University, the writer was served *Bombyx* pupae prepared in this manner. Achieving the rather difficult viewpoint of unprejudiced interest, he found the pupae very delicious, enough so that he determined to investigate the taste of various American Saturniidae, such as *Platysamia cecropia, Actias luna,* and *Telea polyphemus.*

Eating insects may have possibilities beyond the food value. Certainly the Hag Moth population of Nagano Prefecture in Japan meets a challenge in the appetites of the insect eaters. Who can tell what crop increases might result from cultivation of a taste for grasshoppers among the inhabitants of the Great Plains region of the United States and Canada?

Three New Species and a New Genus of American Tingidae (Hemiptera)

By C. J. Drake and E. J. Hambleton

The present paper contains the description of a new genus, three new species and notes on seven species of American Tingidae. The specimens were collected by Edson J. Hambleton. The types are in the Drake collection.

Teleonemia prunellae, n. sp.

Head black, with very short testaceous spines, the hind pair adpressed and a little longer. Rostrum extending beyond mesosternum, brown, the apex dark. Bucculae areolate, closed in front. Orifice with prominent rim. Legs yellowish brown, the tarsi black. Hypocostal ridge uniseriate, the areolae moderately large. Antennae moderately long, densely clothed with rather long hairs, dark fuscous; segment I short, scarcely longer or thicker than II; III slightly more than two and one-half times as long as IV; IV short, scarcely thickened. Legs brown, the tips of femora and tibiae testaceous, the tarsi black.

Pronotum strongly convex, black, shiny, very coarsely pitted, tricarinate; carinae thin, whitish, indistinctly areolate; lateral

carinae deeply, roundly constricted; collar moderately long, biseriate, almost truncate in front; paranota very narrow, thin, whitish; triangular process areolate, becoming whitish at apex. Elytra moderately constricted beyond middle, grayish, opaque, with numerous areolae dark brown to black-fuscous; costal area rather narrow, uniseriate; subcostal area wider, biseriate; discoidal area long, extending beyond middle, with outer boundary nearly straight, widest near middle, there four areolae deep.

Length, 3.40 mm.; width, 0.95 mm.

Type (male), *allotype* (female), and 16 paratypes, Guatemala City, GUATEMALA, May 15, 1945, found on *Prunella vulgaris*.

This species is most closely related to *T. schwarzi* Drake (1918) and *T. huachucae* Drake (1941) but differs from them by its larger size, smooth, and shiny black pronotum. The former feeds on *Beloperone californica*.

Teleonemia prolixa Stal

Numerous specimens, Finca Moca, Guat., July 7, 1945, taken on Cinchona blossoms.

Leptodictya tabida Herrick-Schaffer

Many specimens, breeds on sugar cane, Esquinta, Guat., June 27, 1945. It is also known to occur on bamboo.

Leptodictya bambusae Drake

Common on bamboo, Finca Naranjo, Guat., July 7, 1945. This species is sometimes found on sugar cane.

Leptopharsa lineata Champion

Numerous specimens, Esquintla, Guat., June 27, 1945.

Leptopharsa divisa Champion

Many specimens, Mazatenango, Guat., May 16, 1945, an undetermined species of Rubiaceae.

Corythucha setosa Champion

A long series of specimens, collected on an unidentified tree, Guatemala City, June 10, 1945, and Quetzaltenango, Guatemala, May 19, 1945.

Corythucha decens (Stal)

Several specimens, Guatemala City, Guat., May 15, 1945.

Corythucha gossypii (Fabricius)

Very common, Finca Naranjo, Guat., June 13, 1945, taken on *Canavalia ensiformis.*

PLIOBYRSA, n. gen.

Head short, exposed, with five spines. Antennae long, slender, longly pilose; segment I moderately long, stouter and distinctly longer than II, the latter short; III very long, slenderest; IV moderately long, slightly enlarged. Bucculae reticulate, meeting or nearly meeting in front. Rostral channel uninterrupted, the laminae low; rostrum moderately long. Orifice indistinct. Hypocostal ridge uniseriate. Pronotum moderately convex, finely pitted, tricarinate; hood small, tectiform, scarcely produced anteriorly; paranota usually widest opposite humeri, not produced anteriorly or posteriorly; hind triangular process short, rounded or triangular at apex. Elytra usually gradually widened posteriorly, the tips separated in repose, divided into usual areas; costal area wide; discoidal area short, not reaching middle of elytra; nervure separating subcostal and discoidal areas raised so as to form an inflated area. Margins of elytra finely hairy, serrate or nearly smooth, sometimes veinlets finely hairy.

Generotype, *Pliobyrsa inflata* Drake and Hambleton (= *Leptopharsa inflata* D. & H.).

Leptopharsa adversa Drake and Hambleton and *Leptobyrsa mollinediae* Drake and Hambleton, and perhaps *Leptobyrsa translucida* Champion are congeneric and are here transferred to the new genus *Pliobyrsa.* This genus is distinguished from *Pleseobyrsa* Drake and Poor by the distinctly narrower basal portion of elytra and the nonproduced anterior and posterior margins of paranota. *Planibyrsa* Drake and Poor has unicarinate pronotum and no hood.

Pliobyrsa lateris, n. sp.

Head black, the spines moderately long testaceous. Antennae slender, testaceous shortly pilose; segment I dark fuscous, thicker and slightly more than twice as long as II, the latter brown; III scarcely more than twice as long as IV, the latter a little thicker and pale brown. Rostrum not reaching middle of mesosternum. Bucculae short, nearly touching in front. Legs rather slender, testaceous.

Pronotum dark reddish brown, moderately convex, finely pitted, tricarinate; median carina testaceous, with dark spot in front, uniseriate, much higher than lateral; lateral carinae testaceous, parallel, low, uniseriate, testaceous; hood small, testaceous, slightly protruding in front; paranota rounded, moderately wide, biseriate in front, uniseriate behind, the outer margin serrate; triangular process triangular, membraneous, areolate. Elytra broad, testaceous, with transverse dark fuscous band near base, widened at base, the tips separated in repose, the areolae hyaline, the nervures in apical half fuscous; costal area wide, mostly triseriate; discoidal area very short, inflated.

Length, 2.80 mm.; width, 1.75 mm.

Type (male), *allotype* (female) and 8 paratypes, Mazatenango, GUATEMALA, May 16, 1945, E. J. Hambleton. The shorter antennal hairs, higher median carinae and more abruptly widened elytra at base separate it from other members of the genus.

Pleseobyrsa ablusa, n. sp.

Broad, testaceous, the pronotum brown. Head black, the frontal pair of spines short, brown, directed forward, the median very short, the hind pair greatly reduced. Rostrum yellowish brown, extending to base of mesosternum; laminae low, testaceous. Antennae moderately long, shortly pilose; segment I thicker and nearly three times as long as II, the latter short and brownish; III very slender, testaceous, two and one half times as long as IV; IV brownish, slightly thickened, with longer hairs. Bucculae testaceous, closed in front. Orifice present.

Pronotum moderately convex, coarsely pitted, tricarinate, the calli large, smooth and black; lateral carinae long, parallel, extending from calli to hind margin of triangular process, indistinctly areolate; median carina faintly higher, the areolae scarcely distinct; collar short, yellowish brown, slightly elevated at middle; paranota narrow, testaceous, uniseriate behind, bitriseriate in front, the front margin roundly protruding anteriorly, scarcely reaching middle of eyes. Elytra broad, the areolae hyaline; costal area wide, mostly with five rows of areolae, a narrow transverse band (nervures only) just in front of middle and a transverse vein near base fuscous; subcostal area very wide, with six rows of areolae in widest part; discoidal area short, very broad, with outer boundary costate and sinnate, widest behind middle, there six areolae deep. Wings short, scarcely longer than abdomen. Abdomen beneath dark fuscous. Legs testaceous.

Length, 4.10 mm.; width, 2.85 mm.

Type, male, Changos, PERU, September, 1912.

This species differs from *P. peruviana* Drake by its narrower paranota, long lateral carinae and much wider subcostal area. The lateral carinae are not present on hind triangular process of pronotum in *peruviana*. Type in Drake Collection.

Notes on Cerambycidae of South Carolina (Coleoptera)

BY FRANKLIN SHERMAN,* Clemson College, Clemson, South Carolina

Since the writer began faunal survey work in South Carolina in 1925, he has given the family Cerambycidae some special attention. Adults have been collected from flowers, at lights, and on plants in all parts of the state, and a number have been recorded in association with their host-plants by rearing or otherwise.

Our records indicate May, June and July as the most productive months for collecting of adults in this state, particularly with

*Technical Contribution No. 132 from the South Carolina Experiment Station.

the flower-frequenting species. The flowers of Jersey tea and wild hydrangea, especially in our mountains, attract the greatest variety of species, with decidedly smaller numbers on flowers of dogwood, wild rose, spirea, elder, daisies, goldenrod, and others.

Identifications of many of the species have been made by ourselves, the more difficult ones by Mr. W. S. Fisher and Mr. J. N. Knull, to whom our thanks are due, also to Mr. A. Boving for identification of larvae in a few cases.

Our records show a total of 222 species and subspecies recorded from this state, one of which was obviously an accidental individual introduction.

The western tip of South Carolina with mountains attaining 3,600 ft. elevation, shows a strong infusion of northerly and westerly forms, while the eastern coastal area shows an infusion of southerly forms. The main central area of the state gives some mixture of these extremes, plus numerous species which are of wide general distribution in this part of the country. This same condition is exhibited by other faunal groups, i.e., amphibians, reptiles, birds and mammals.

In about 60 species our records represent an extension of the known range as indicated in Leng's Catalogue. A few new species or varieties (not yet described) have been taken.

Our 222 species are distributed among 95 genera, of which 66 genera have only 1 species each in our faunal list.

Among the northerly and westerly forms are:

Prionus laticollis (Drury)
Tessaropa tenuipes (Hald.)
Stromatium pubescens Hald.
Romaleum rufulum (Hald.)
Heterachthes 4–maculatus Fab.
Obrium rubidum Lec.
Hapalosalia aurata Horn
Hapalosalia ribex Newn.
Plectrodera scalator Lec. and many others

Of the more southerly forms there are:

Archodontes melanopus (L.)
Derobrachus brevicollis Serv.
Scaphinus muticus (Fab.)
Criocephalus nubilis Lec.
Methia necydalea (Fab.) (others)
Callichroma suaveolens (L.) (a beautiful species!)
Phychodes trilineatus (L.) and others

Of rare or unusual species, or ones at least pleasing to secure, there are:

Derancistrus taslei Buq.
Eburia distincta Hald.
Centrodera decolorata (Harris)
Evodinus monticola (Rand.)
Gaurotes cyanipennis (Say)
Leptura emarginata L.
Bellamira scalaris (Say)
Euryptera lateralis Oliv.
Encyclops coerulea (Say)
Necydalis mellita Say
Physocnomum brevilineum Say
Arhopalus fulminans (Fab.)
Xylotrechus acerina Fisher
Xylotrechus nitidus Horn (very rare, fide Knull)
Anthoboscus ruricola (Oliv.)
Michthysoma heterodoxum Lec. (an "ant-like" species)
Purpuricenus humeralis (Fab.)
Cyrtinus pygmaeus (Hald.) (our smallest cerambycid)

For years we searched in vain for the "cloaked knotty-horn" elder borer *Desmocerus palliatus* Forst., but in June 1939 we found it quite common on elder in mountain valleys near our northern (the N. C.) border.

The most noteworthy recent addition to our list came last year (1945) when Mr. O. L. Cartwright took a series of the large and conspicuous *Plectrodera scalator* Lec., associated with quaking aspen trees in the "sandhills" section of South Carolina; it seems to be chiefly a Mississippi valley species.

Our "accidentally individually introduced" species is *Chlorophorus annularis* Fabr., from Japan. In August 1934 an adult was caught in the act of emerging from an imported Japanese bamboo fishing-rod in a hardware store in Walhalla, South Carolina, and it was given, still alive, into our possession—an illustration of how potentially serious pests may innocently be spread by commerce.

Personal

Dr. J. Linsley Gressitt has been separated from the Navy where he was an entomologist in the U. S. Naval Medical Reserve Unit No. 2, and is returning to the Lingnan Natural History Survey and Museum and to the Biology Department of Lingnan University, Canton, China.

The Dipterous family Tylidae (Micropezidae) in Colorado

By MAURICE T. JAMES,
Department of Entomology, Colorado Experiment Station,
Colorado A. & M. College, Fort Collins, Colo.[1]

In his review of the Neriidae and Tylidae (Micropezidae) of America north of Mexico, Cresson [2] recorded seven species as occurring in Colorado. In working over the accumulated material in the collection of the Colorado A. & M. College, I was able to identify all seven of these species, but no others except for one that is apparently new to science. The present paper is offered for the purpose of describing that species and of adding to our knowledge of the geographical distribution of the others. No citations to the literature will be given, since these can easily be found by consulting Cresson's work. The terminology corresponds to that used by Cresson, except that I am accepting the Meigen 1800 names as valid and, consequently, adopting the generic name *Tylos* instead of *Micropeza*.

Tylos lineatus (Van Duzee)

This species is common throughout the eastern Colorado plains and into the foothills. At Roggen, it occurs in June. Most records are for elevations under 6,000 feet; however, I have taken it at Salida (7,050 feet), Aug. 3, 1938. The only record for western Colorado is from Maybell (5,903 feet) but it undoubtedly occurs widely at similar elevations, since it is widespread in Utah.

Tylos setaventris (Cresson)

Costilla County, July 19, 1932, 1 ♀.

[1] Colorado Agricultural Experiment Station Scientific Journal Series Number 207.

[2] Trans. Amer. Ent. Soc., LXIV, pp. 293–366, 1938.

Tylos turcanus (Townsend)

Common at Roggen, May 19 to June 16, where it occurs in general earlier than *T. lineatus,* though overlapping that species in seasonal distribution. The only other localities from which this species is recorded are in Arizona. This is only one of a number of southern species that extend into the sandhills area of the South Platte Valley.

Paracalobata univitta (Walker)

Cresson's record from "Marysville" should read "Maysville." I have several specimens from Fort Collins, June 14 to July 18.

Paracalobata pallipes (Say)

Widespread east of the Rockies and at lower elevations in the foothills; I have taken it, however, on La Veta Pass (9,378 feet) and at Pingree Park (9,300 feet).

Paracalobata mima (Hennig)

Apparently common in the mountains, mostly above 8,000 feet. The lowest locality from which I have a record is Steamboat Springs (6,680 feet). In his records of this species, Cresson erroneously stated that Pingree Park is in Pueblo County; actually, it is in Larimer County, north of Rocky Mountain National Park.

Paracalobata microfulcrum, n. sp.

♂, ♀. Head mainly black; frontale usually narrowly reddish-yellow immediately above base of antennae; parafrontal yellow anteriorly, gradually darkening to black on posterior half; face and bucca yellow; oral margin chiefly yellow but with some infuscation; proboscis brownish; palpus yellow; antenna yellow, the arista black, sparsely pubescent basally. Entire head covered with cinereous pollen, that of the velvety frontale sparse but evident in an oblique light; that of the median half of the posterior orbit likewise sparse. Some yellowish pile on face, occiput, and proboscis. Thorax wholly black; pronotum, humerus, pteropleuron, and lower and posterior parts of meso-

pleuron shining; mesonotum with a large subshining area covering most of the postsutural region except the broad margins and extending onto the posterior third of the presutural region, with sometimes extentions forward in the form of one or two indistinct vittae; thorax otherwise cinereous pollinose. Pile of thorax whitish to yellowish; bristles black. Halteres yellow. Wings yellowish hyaline; veins pale yellow. Legs chiefly yellow; middle and hind coxae black; each femur with an extensive black posterodorsal vitta, the middle and hind femora being sometimes largely blackish or brownish-black; hind tibiae usually brownish-black except at extremities; tarsi sometimes infuscated apically. Coxae cinereous-pollinose, legs otherwise subshining. Abdomen black except fulcrum and apical half of claspers, which are yellow; mostly shining, the first segment cinereous pollinose dorsally, the genital segments of male with sparse cinereous pollen; hairs scattered, short, whitish. Claspers (fig. 1) of male of ordinary size; terminal lobe oval, flattened, with a triangular lobe extending backward; fulcrum very small, weakly bilobed. Ovipositor cylindrical, somewhat flattened toward base, distinctly auriculated at base. Length, 5 to 6 mm.

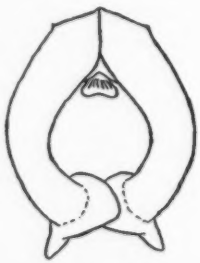

FIG. 1

Holotype, ♂, *allotype*, ♀, and *paratopotypes*, 1 ♂, 4 ♀, Divide, Colorado, July 19, 1937 (M. & H. James); paratypes, 1 ♂, Florissant, Colo., July 21, 1937 (M. & H. James), and 1 ♂, Webster, Colo., Aug. 1, 1938 (M. T. James, Urless Lanhan). Types in the Colorado A. & M. College collection.

In Cresson's key this species runs to *pallipes* and *mima,* but differs from both those species in the much more extensive darkening of the legs and the small size of the fulcrum. The ovipositor is auriculated basally, as in *pallipes,* but the lobes are less prominent.

Cnodacophora nasoni (Cresson)

Apparently a high altitude species, so far as habitats in Colorado are concerned. Cresson recorded it from Electra Lake; I have specimens from Salida, Pingree Park, and Kenosha Pass, all taken in August.

Additions to the Checklist of the Cicadellidae at Chatham, Virginia, with Eleven New Records for the State

By GEORGE WENE,[1] Virginia Agricultural Experiment Station Field Laboratory, Chatham,, Virginia

During the summers of 1941 and 1942 leafhopper collections were continued at Chatham, Virginia. These collections were taken within a two mile radius of the Agricultural Experiment Station Field Laboratory. As in the original checklist by Wene & Dominick (1941),[2] the names are brought up to date according to DeLong & Caldwell (1937).[3]

Thirty-nine more species were collected in this area, eleven of which have not been recorded before in this state, and can be considered as new records. This makes a total of 104 species

[1] Now at the Dept. of Entomology, Cornell University, Ithaca, N. Y.

[2] WENE, GEORGE, and C. B. DOMINICK. A Checklist of the Cicadellidae at Chatham, Virginia, with Thirteen New Records for the State. Va. Jour. Sci., vol. 2; pp. 122–123. 1941.

[3] DELONG, D. M., and J. S. CALDWELL. Check List of the Cicadellidae (Homoptera) of America, North of Mexico. Ohio State University; pp. i–iv and 1–93. 1937.

which were collected in this small area. A total of 24 new records were found here also. In the following list of additional species, the new records are marked with an asterisk.

Helochara communis Fh. 6–22–41.
Spangbergiella mexicana Bak. 7–8–41.
Osbornellus consors (Uhl.). 7–1–41.
Osbornellus scalaris (V. D.). 8–23–41.
Osbornellus unicolor (Osb.). 8–23–41.
Platymoideus acutus (Say). 6–14–40.
Nasutoideus vercundus (V. D.). 8–13–41.
Nasutoideus magdalenis (Prov.). 6–5–40.
Polyamia interruptus DeL. 7–12–41.
Unerus colonus (Uhl.). 6–22–41.
Ophiola striatula (Fall.). 5–29–41.
Amblysellus curtisii (Fh.). 7–12–41.
**Drylix parallelus* (V. D.). 6–7–41.
**Phlepsius attractus* Ball. 5–27–41.
Texananus majestus (Osb. & Ball). 8–15–41.
Graminella fitchii (V. D.). 7–26–41.
Chlorotettix spatulatus Osb. & Ball. 6–22–41.
Chlorotettix tunicatus Ball. 8–23–41.
Macrosteles wilburi Dorst. 6–26–41.
Forcipata loca Del. & Cald. 5–21–41.
Empoasca maligna Walsh. 7–25–41.
**Empoasca atrolabes* Gill. 6–7–41.
**Empoasca unica* Prov. 7–9–41.
**Empoasca adunca* DeL. 6–27–41.
Empoasca birdii Godg. 8–18–41.
Typhlocyba pomaria McA. 6–24–41.
**Typhlocyba aureotecta* (S. & DeL.). 5–27–41.
**Eupteryx melissae* Curt. 6–20–41.
**Hymetta distincta* Fair. 6–26–41.
Erythroneura vulnerata Fh. 5–21–41.
**Erythroneura lawsoniana* Bak. 7–1–41.
**Erythroneura noevus* Gill. 6–26–41.
Erythroneura obliqua (Say). 8–18–41.
Erythroneura morgani (DeL.). 8–23–41.
Erythroneura hartii (Gill.). 6–22–41.
Erythroneura comes (Say). 7–26–41.
Erythroneura tricincta Fh. 7–26–41.
Erythroneura vitis (Harr.). 6–30–41.
**Erythroneura omaska* Rob. 8–23–41.

Notes and News in Entomology

Under this heading we present, from time to time, notes, news, and comments. Contributions from readers are earnestly solicited and will be acknowledged when used.

Recent papers on the insect cuticle. It is well known to every entomologist that most insects are highly resistant to wetting by water, that is, their cuticle is hydrophobic. Following the work of Kühnelt (1928), Wigglesworth (1933) and Pryor (1940), this water-repellent property has been attributed to a waxy or at least fatty layer on the outer surface. Sometimes this waxy layer is considered to be the epicuticle, more commonly the hydrophobic layer is considered to be a waxy layer on the outer surface of the non-chitinous epicuticle. Being hydrophobic, this waxy layer is commonly thought to control to a large extent the permeability of the cuticle—both control evaporation leading to desiccation and control the entry of some contact insecticides. Undoubtedly it does play a very important role in this connection as is well illustrated by several recent papers from workers in England.

In 1935, Ramsey [1] reported that the cockroach is covered with a water-resistant grease which deters evaporation at ordinary temperatures, but that if the temperature is raised much above 30° C. (87° F.) the mobile grease layer undergoes a change of phase, its continuity is destroyed, and loss of water by evaporation (= transpiration) increases tremendously. This has been confirmed and greatly extended in a recent paper by Wigglesworth.[2] Briefly stated, Wigglesworth has studied the loss of water from numerous species of insects (with spiracles plugged to exclude evaporation via the tracheal system) by successive weighings after holding in a dry atmosphere for some hours at various temperatures. For some insects (e.g. larva of the fly *Bibio*) there is a straight line relationship between temperature and weight loss attributable to evaporation, i.e., at any higher temperature water is lost more rapidly just as it would

[1] Jour. Exp. Biol., 12: 373–383. 1935.
[2] Jour. Exp. Biol., 21: 97–114. 1945.

be from an open dish on heating. These are insects which *lack* a waxy coating and normally live perforce in a moist environment. In a dry environment they promptly dry up and die.

For many insects, however, evaporation is very slight until a certain "critical temperature" is reached (e.g., cockroach, wireworms, mealworms, bugs, etc.). As soon as these insects reach this "critical temperature" evaporation suddenly becomes very rapid and the insect dries up. These are insects which *possess* a waxy coating—they may normally live in either a moist or a dry environment. The "critical temperature" is not the same for all species; in some it is near 30° C. (87° F.), in some near 40° C. (105° F.), in some near 50° C. (123° F.), and in extreme cases over 60° C. (140° F.).

The simplest way of showing that the effect is not due to vital processes is to repeat the experiments with dead insects. The same results on rates of evaporation are obtained with dead as with living insects (and so for convenience after preliminary validating experiments dead insects were used). It is possible to detect physical changes in the waxy layer after passing the "critical temperature" but an even better method of showing that the waxy layer is the dominant factor in controlling evaporation through the cuticle is to scratch or abrade this layer at temperatures below that "critical" for the species being used. Once the waxy layer is extensively interrupted evaporation jumps. So it seems reasonable to conclude that when the waxy layer is interrupted in any manner an increased rate of evaporation will result. The layer can be interrupted by heating to the point of phase change or by abrasion or by removal with solvents. All give the same effect.

To elucidate the reason for different "critical temperatures" for different species, Beament [3] extracted the waxes from various species and examined their physical properties. They have different melting points and different phase-change points, and these are correlated with the "critical temperatures" of the species from which the waxes were extracted. Further, these

[3] Jour. Exp. Biol., 21: 115–131. 1945.

waxes placed on artificial membranes showed "critical temperature" properties similar to those of the cuticle of the insects from which the wax came. It is also interesting that the nature of the membrane on which the waxes are deposited is important, and that cuticle gives a better binding for insect waxes than for instance tanned gelatin or collodion.

An interesting ecological consideration arises from the work on abrasion. Numerous soil-inhabiting insects (e.g. wireworms) are endowed by nature with a highly water resistant waxy coat but they get this so badly scratched against soil particles that if they are removed from their moist environment they promptly dry up and die. Further, a satisfactory explanation of the lethal action of abrasive dusts, commonly used in insecticides, is obvious in similar terms.

Most recently, Beament [4] has shown a similar waxy layer on the insect egg shell but in this case the wax layer is on the *inside* of the shell, not on the outer surface. Being on the inside it is not in a position to be abraded by dusts and can be reached only by chemicals that can first traverse the *seven* protein layers of the shell. Likely we have here a partial answer to the question of why numerous good insecticides do not kill eggs.

Of course, only a fraction of the properties of the cuticle and only a part of the story of cuticle permeability depend on these waxy coats, but undoubtedly the waxy layer does play an extremely important role in those insects which possess such.—A. GLENN RICHARDS.

Present State of Some German Museums. Under the above title Francis J. Griffin, Registrar of the Royal Entomological Society of London, has contributed an informative summary in the May 11th issue of NATURE, his comments being based on an officially approved visit, made to determine definitely what the present condition of at least some of the German museums might be. As many German museums were depositories for great and important entomological collections, particularly rich in type material, any authentic information on their present con-

[4] Nature, 157: 370. 1946.

dition is of interest, and an abridged analysis of portions of Dr. Griffin's article is here given for American entomologists who might not have access to the original report.

Dr. Griffin summarizes the general condition in "one lasting impression," i.e. "the certainty that it will be many years before anything approaching normal conditions returns to German museums. The destruction of buildings must be seen to be believed, and one may be excused for thinking that there is a good case for abandoning such towns as Cologne, Frankfurt, Stuttgart and others and building new towns on alternative sites." He adds, however, that "by and large, scientific collections have emerged from the war with relatively little damage since for the most part they were evacuated in time. It has certainly been proved that such a policy was wise. Exhibition collections and teaching material, on the other hand, have usually suffered the fate of the museum or university building in which they were kept, while 'souvenir-hunting' has added to the losses."

The Museum at Darmstadt is said to be destroyed, but it was not possible to determine whether the contents had earlier been removed. The same is true of the Museum at Karlsruhe. The building of the Stuttgart Museum is burned out, and the collections suffered severely. The most valuable part of the Stuttgart entomological collection was evacuated to a salt mine at Kochendorf, where it still was in November, 1945, while other parts of the collection were deposited in various castles in the vicinity of Stuttgart. It is thought that none of the Stuttgart entomological types have been lost. Dr. E. Lindner and Dr. Götz, both entomologists, are still at the Museum.

The Niederrheinisches Museum at Duisburg is completely wrecked and its contents are nothing but debris. The Zoologisches Institut building at Bonn is completely destroyed, and the entire collections are said to be lost. These include the Winnertz collection of Diptera, part of the Nees von Esenbeck collection of Hymenoptera, both with type material, and the Bruch collection of Coleoptera, while a portion of the Reichensperger collection of myrmecophiles was also destroyed. The

library of the Naturwissenschaftliches Institut at Göttingen was evacuated to a salt mine at Wolpriehausen and shared the mine with a munition dump. The latter blew up and a portion of the library is believed to be lost. The Institut building is a total loss, but the collection is undamaged.

The buildings of the famous Senckenberg Museum at Frankfurt on Main are very seriously damaged, having been burned out and also hit by high explosive bombs. The collections, aside from the exhibition series, were evacuated to more than forty different places, and all but one of these escaped damage, the one being completely destroyed. Apparently no entomological material was contained in the destroyed section. The library of the Senckenberg Museum was evacuated and is said to be safe.

The Deutsches Zoologisches Museum (formerly the Zoologisches Museum der Universität) at Berlin is very heavily damaged. The Russians appointed Drs. H. Bischoff (whose name will long be connected with the Nazi-enforced wanderings of the Wasmann collection of ants) and H. Pohle as directors, and entomologists on the now reduced staff are said to be Drs. M. Hering, W. Ramme, and H. Hedicke, and Messrs. N. J. Kardikoff and M. Eisentraut. The Museum was declared an independent institution, free from the University, by the Russians in September, 1945. The following entomologists, known for their association with the Berlin Museum, are said to have been alive November, 1945: Drs. Freise, and G. Enderlein, and Messrs. Bluthgen and Hans Wagner. Those said to be dead include Alfken, Max Muller, Engel, Draudt, Urbahn, Henning and Pappenheim. The collections are partially destroyed (estimated loss in entomology one-fifth), but the main part is safe. Much of the Hering collection of leaf-miners has been destroyed, but many of its bred specimens have been saved. The Staudinger collection, including the Microlepidoptera, is safe. The Museum Library was first evacuated to Altlitz-on-Oder, but, shortly before the Russian advance, was largely returned to Berlin, where it now is. Only six cases with their contents are lost, and these are known to have been burned. Working conditions at the Museum are said to be deplorable,

as no glass for window replacements is available and weather damage is progressively destructive to collections and publications, to the preservation of which the small staff, working under many handicaps, is now largely devoting its energy.

The building of the Deutsches Entomologisches Institut in Gosslerstrasse (Berlin-Dahlem) is practically undamaged, but the contents were evacuated to Post Blucherhof, Mechlenburg, where they are believed to be intact. The present director Dr. H. Sachtleben is presumed to be at Post Blucherhof with the collection.

Wolcott Collection of Cleridae. Mr. Albert Burke Wolcott, of Downers Grove, Illinois, has presented his collection of 4,740 insects, including types, to the Chicago Natural History Museum, according to Clifford C. Gregg, director. Mr. Wolcott, a former member of the museum staff, did a great deal of work on the Cleridae and, according to Karl P. Schmidt, chief curator of zoology, this collection will make the museum's representation of those beetles more comprehensive than any other in the western hemisphere.

Correction

In T. D. A. Cockerell's review on The Adelid Moths of South Africa, the end of the quotation should come at the end of line 28 on page 63 (Vol. 57, no. 2), after the word "subgenera." After this line, insert the following: but having said this, he proceeds to treat them as genera.

Notice

Due to various circumstances, the titles of papers from current entomological literature that are ordinarily found in each issue of the NEWS are omitted but will appear in our next issue.

Review

THE MOSQUITOES OF THE SOUTHERN UNITED STATES EAST OF OKLAHOMA AND TEXAS, by Stanley J. Carpenter, Woodrow W. Middlekauff and Roy W. Chamberlain, American Midland Naturalist, Monograph 3, 292 pp., University Press, Notre Dame, Ind., May 1946.

So overwhelming are the destructive results of war that it is a pleasure to consider such a constructive result as this new book. The 4th Service Command Laboratory at Fort McPherson, Georgia was the center of mosquito work in the southeastern states during the war period, and from the great amount of information gained from mosquito control work in this area, the authors have taken the opportunity to produce this excellent hand book. The very fine illustrative work at once catches the attention. Drawings of the larvae and male terminalia are given for all species. Other adult structures are included where they are of diagnostic value. Of the page space for each species about 40% is used for the illustrations, which will indicate the emphasis on this feature. The first 48 pages are devoted to bionomics, relation to disease, techniques of collecting, preparation and storage of material, and general morphology. The remainder of the work contains the treatment of 71 species or subspecies together with keys to the adults, the larvae, and the male terminalia. There is also a bibliography of 188 references and a full index.

Comparing the widely used reference of King, Bradley, and McNeel [1] on The Mosquitoes of the Southeastern States very great progress is evident in the completeness of data on bionomics, distribution, descriptions and keys. Relatively little, however, has been added in the way of new species and taxonomy. Considering the three new species or subspecies described since 1940: specimens of *Aedes fulvus pallens* had been confused with true *Aedes bimaculatus; Psorophora longipalpus* was likewise confused with *P. howardii;* and *Aedes mathesoni*

[1] W. V. King, G. H. Bradley, and T. E. McNeel, U. S. Dept. Agr., Miscl. Pub. 336, 90 pp., 1939.

may be a melanic development of *A. canadensis*, it is evident that few if any species remain to be added to the fauna other than the possible appearance of extralimital species. On the other hand interesting problems remain to be answered, as for example, the evolutionary status of the subspecies of *Anopheles crucians* or the two species of *Orthopodomyia*.

Some details of form may be questioned, such as, the alphabetical sequence of species under the subgenera rather than placing the most nearly related species adjacent to one another. It is fortunate that forms of *Anopheles crucians* are subspecies rather than species and *Culex pipiens* and *quinquefasciatus* are so named and thus placed together, but surely if one knows to which subgenus a species belongs he will have little trouble in locating the page without the use of the index. Considering the index we wonder why the page reference was omitted where the species is listed separately and not under the generic name. Generic names come and go and most people prefer to look up the species name directly. Presumably the drawings were made from selected specimens and therefore the value of such drawings would have been greatly increased if the geographic locality of the specimen had been given. It is not unlikely that some of the species may become subdivided into races or geographical subspecies, in which case the drawings may become indeterminate or misleading. For those not directly interested in mosquitoes this book may be a useful guide as to how other groups of insects might be treated. No publication is ever perfect or will please all people, but surely the authors and the many other persons who have contributed to this book should feel well pleased with the result.—H. R. Roberts.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Wanted—Mosquitoes for determination, or exchange for S. E. specimens. Particularly desire larvae. H. R. Dodge, Box 1095, Macon, Ga.

Arctic Lepidoptera on hand, including Erebia, Oeneis and Brenthis. R. J. Fitch, Lloydminster, Sask., Canada.

Odonata—Will buy or exchange North and Central American species, both imagos and nymphs. Also will exchange other orders for Odonata. Carl Cook, Crail Hope, Kentucky.

I want to collect Rothschildia farbesi, agapema, galfina and io moths for interested persons. E. Frizzell, Route 4, San Benito, Texas.

Wanted—Information as to the existence and present location of a copy of Solodonikov, S. V. Contribution à l'étude de la faune et de la biologie des larves des Libellules du Donetz et de certains de ces affluents. [In Ukrainian.] Trav. Soc. Nat. Charkow 52: 249–268. 1929. [Quoted from Zool. Rec. 1936, Ins. p. 147, No. 3114.] P. P. Calvert, P. O. Box 14, Cheyney, Penna.

Wanted—Crane-flies (Tipulidae) of New Guinea, New Caledonia and Neighboring Islands, for revisional purposes. Also, names and addresses of individuals or institutions possessing any of these flies. Correspondence solicited. Chas. P. Alexander, Fernald Hall, Amherst, Mass.

I want to collect Pennsylvania insects from York and Adams Co. E. W. Mange, 307 W. Walnut St., Hanover, Pa.

Lepidoptera—Wanted, Hyloicus (Sphinx) and other Sphingidae in exchange for U. S. and Wisconsin Lepidoptera. Wm. E. Sieker, 119 Monona Ave., Madison 3, Wisconsin.

Hymenoptera-Aculeata (except ants and bees) and **Ichneumonidae** for exchange or purchase. Will collect any order in exchange. D. G. Shappirio, 4811 17th St., NW, Washington 11, D. C.

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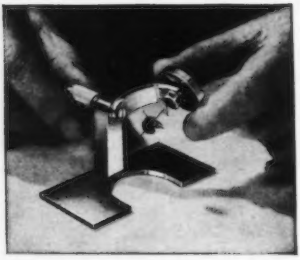

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THE BIOLOGY AND IDENTIFICATION OF TRYPETID LARVAE

By VENIA TARRIS PHILLIPS

Memoirs of the American Entomological Society, No. 12, 161 pp., 16 pls., 1946

This is a comprehensive work describing and figuring the important characteristics of the larvae of forty five species of American fruit flies (Diptera). An indispensible work for economic entomologists. It includes a glossary of the terms used in the descriptions; a list of 442 species of the family, with their known hosts; a list of their host plants; and an extensive bibliography. The plates contain 192 exquisitely executed figures.

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